

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

THE New York correspondent of the *Times* announces that Dr. Charles W. Eliot's resignation of the presidency of Harvard University will take effect in May next.

MISS HOLLAND WREN has been appointed by the council of the Pharmaceutical Society demonstrator in the society's School of Pharmacy. This is the first time a woman has been appointed to such a position since the school was established more than sixty years ago.

THE current number of *Child Study*, the journal of the Child Study Society, which is published quarterly, contains an article by Dr. Alex. Morgan, principal of the Provincial Training College, Edinburgh, on child study in relation to the training of teachers. Dr. Morgan thinks there is a tendency to over-estimate the practical utility at the present time of psychology in education, and though he hopes the time will come when we shall have a scientific pedagogy founded entirely on a scientific psychology, he is of opinion that this day is not imminent.

It is stated in the *Pioneer Mail* that Mr. Chinubhai Madhowlal has given four lakhs of rupees in $3\frac{1}{2}$ per cent. Government securities to be applied by the Government towards the development of science teaching in Ahmedabad, in connection, if possible, with the proposed Curline Institute in Bombay. The Governor, in acknowledging the gift, is reported to have said that the response to his appeal for means to develop science teaching in the Presidency is far more generous than he had dared to hope, and the splendid benefactions, amounting to eighteen lakhs, prove alike the large-hearted patriotism of the givers and their recognition of one of India's greatest educational needs.

THE Department of Agriculture and Technical Instruction for Ireland has re-published in pamphlet form an article by Mr. A. E. Easthope, principal of the technical schools and organising secretary for technical instruction in the county of Louth, on technical instruction in Dundalk. The article originally appeared in the department's *Journal* (vol. viii., No. 4). This is the sixth of a short series of articles on recently established Irish technical schools. The Municipal Technical School, Dundalk, is housed in a new building specially erected for the purpose, and Mr. Easthope's description and the illustrations of various departments of the school serve admirably to illustrate the progress being made in this department of Irish education.

THE report for the year ending on June 30 last of Mr. Charles Madeley, director and librarian for the Warrington Museum Committee, shows that the educational work in connection with the museum continues to be developed. There was during the year a notable increase in the number of accessions to the museum. Continued interest is taken in the wild-flower table, which is a distinctive feature of the work done at Warrington. The average number of species on view during July to October was 175, the maximum, 200 species, being reached on September 4. In the autumn the flowers were succeeded by fruits and seeds. Personal observation has proved that the number of persons making regular visits for the purpose of studying these plant specimens is on the increase, and the number of inquiries for botanical information continues to grow. Additions have also been made to the specially arranged educational exhibits, particularly in the botanical gallery and the department of invertebrate animals. It is to be hoped that the authorities of more provincial museums may follow the example of Warrington and make their exhibits serve an educational purpose of a definite kind.

THE calendar of University College (University of London) for the session 1908-9 has just been issued. It contains many new features. The outline of the history of the college, by Dr. Carey Foster, has been revised and brought up to date. The calendar also contains a set of plans that show more completely than before the uses to which the extension of buildings is being put. The new buildings have resulted in extended accommodation for the libraries, for the faculty of arts, for the departments of geology, hygiene, experimental psychology, and for each

of the departments of the faculty of engineering. The calendar also contains a section setting forth in full the arrangements for post-graduate courses of lectures and the facilities for research work. The regulation with regard to admission is as follows:—"On the recommendation of the professor of any department, any student qualified to undertake research work may be admitted to the college for the purpose of undertaking such work. Each student so admitted shall pay in the office a registration fee of 1*l.* 1*s.* per session, and such other fee (if any) as the regulations of the department may require, and shall bear the cost (if any) of his work." It appears from the summary of students that there were no fewer than 229 post-graduate and research students in the college last session.

THE annual general meeting of the Association of Teachers in Technical Institutions was held on November 7 at St. Bride's Institute, Bride Lane, London. In moving the adoption of the report, Mr. Charles Harrap, the president, congratulated the members on the steady progress which has been made. He went on to say it is time there was a technical college for training teachers. No one knows better than the members of the association how difficult it is to get competent technical handicraft teachers—men who have worked at the trade and know how to teach it. Such men, when found, deserve the best treatment from authorities in order that they may be retained for the benefit of technical instruction generally. Among the difficulties which have to be overcome if English technical education is to be successful is the necessity of obtaining the concurrence of both employers and employees in any scheme intended to substitute trade-school training for part or whole apprenticeship. The London County Council has been able to form two consultative committees, one for the bookbinding and another for the printing trades, each committee consisting of three employers, three representatives of the employees, and three London County Council nominees. One of these committees has completed its preliminary work, and in due course an experimental school is to be tried where lads can undergo a proper preparatory training for the trade. The youths will generally be selected by scholarship tests, and may enter the preparatory trade training school from 12½ years of age. The newly elected president of the association is Mr. J. Wilson, head of the chemical department, Battersea Polytechnic, S.W., who has acted as honorary secretary of the association since its formation in 1904. His successor in that office is Mr. P. Abbott, head of the mathematical department, Regent Street Polytechnic, London, W.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 25.—"Eutectics Research, No 1. The Alloys of Lead and Tin." By Walter Rosenhain, with P. A. Tucker. Communicated by Dr. R. T. Glazebrook, F.R.S.

Attempts to prepare pure eutectic alloys led to the discovery of discrepancies between the authors' experiments and the data on lead-tin alloys published by Roberts-Austen. The present paper contains an account of the complete re-determination of the equilibrium diagram of the lead-tin series. The eutectic point is now placed at 63 per cent. of tin, and the eutectic line ends, towards the lead end of the series, at 16 per cent. of tin, while a series of transformations in the solid alloys, with a maximum temperature lying at 150° C., has been discovered. By the aid of levigated oxide of chromium the alloys have been polished for microscopic examination, and this has enabled the authors to decide many points with greater accuracy. For the purposes of microscopic examination, and also for cooling-curve purposes, specimens of the alloys were kept at temperatures of 175° C. for periods up to six weeks, and some were quenched in liquid air. Cooling and heating curves ranging down to -180° C. were also taken. By these means it was shown that the transformation above mentioned consists in a change in the solid solution of tin in lead, which passes from a β into an α condition, at the same time rejecting tin from solution.

The structures observed in lead-tin eutectic alloys are described in detail, and evidence is given for the view that this alloy consists of an aggregate of spherulitic crystals. The authors have also examined the structure of "alloys" prepared by the compression of powders (Spring's method), and have found them to consist of aggregates of the original particles in an unchanged condition.

"The Boiling Point of Sulphur on the Constant Pressure Air Thermometer." By N. **Eumorfopoulos**. Communicated by Prof. H. L. Callendar, F.R.S.

The experiments described in this paper were carried out with a view to the re-determination of the boiling point of sulphur, the value ($444^{\circ}53$) previously obtained by Callendar and Griffiths being open to some doubt.

The air thermometer, made of Jena glass 16 III., is substantially that described by Callendar (Roy. Soc. Proc., vol. 1, p. 247), except that the final adjustment of pressure is made with the help of an oil gauge.

The formula to be used with this thermometer is shown to take a simple form, the necessary corrections being small. In particular, the uncertainty of the temperature of the "dead space" is eliminated by means of compensated tubes. The sensitiveness of the oil gauge is given for different temperatures, and its diminution with rise of temperature shown to have little practical importance.

All the volume determinations are made with mercury. The expansion of the bulb was obtained by treating it as a weight thermometer, observations being made at 0° , 100° , and 184° . If the Regnault-Broch formula for the expansion of mercury is taken, the experiments lead to the following expression for the coefficient of expansion of the glass,

$$\{23868 + 4 \cdot 20(t - 100)\} 10^{-9},$$

but with Chappuis's value to

$$\{24254 + 23 \cdot 47(t - 100)\} 10^{-9}.$$

Reasons are given for preferring the former value, thus suggesting that the true value for the coefficient of expansion of mercury is still unknown.

The boiling point of sulphur was determined directly on the air thermometer; the mean of the eleven values obtained is, at normal pressure, $443^{\circ}62$.

The changes of volume of the bulb when heated in sulphur vapour were a source of trouble and some uncertainty, although the bulb had been previously annealed for many hours.

"Note on the Boiling Point of Sulphur." By Prof. H. L. **Callendar**, F.R.S.

One of the chief difficulties in the accurate determination of high temperatures by means of the gas thermometer is the uncertainty of the correction for the expansion of the bulb. The whole correction may amount to as much as 5° C. at 445° C. (the boiling point of sulphur) or 30° C. at 1000° C. The uncertainty of the correction is due to the fact that it cannot be directly determined, but must be inferred from observations of the linear expansion of the material of the bulb, or from observations with a mercury weight thermometer, in which the expansion of mercury is assumed. There are obvious objections to assuming that the cubical coefficient of expansion of an asymmetrical bulb is three times the linear. The method of the mercury weight thermometer would be theoretically perfect but for the fact that the temperature range available is somewhat restricted, and that the absolute expansion of mercury is more or less uncertain. The extrapolation of the observations beyond 300° C. is attended with some uncertainty, and the differences of the formulæ proposed to represent the expansion of mercury, though inconsiderable at low temperatures, become important when extrapolated. The value of the boiling point of sulphur hitherto assumed as the basis of the platinum scale of temperature, namely, $444^{\circ}53$ C., depends on the determination of the correction by the linear expansion method alone. It appeared desirable to corroborate this result by the weight thermometer method.

With this object, Mr. Eumorfopoulos undertook a series of observations with a very delicate gas thermometer of

Jena glass, the bulb of which was fitted to serve also as a mercury weight thermometer. The results of the several independent series of observations agreed among themselves to less than a tenth of a degree at the boiling point of sulphur, but differed by about 2° C. in the absolute value of the boiling point according as the formula of Regnault or that of Chappuis was adopted for the expansion of mercury. The value, according to Regnault's formula, was $443^{\circ}6$ C., but it was $445^{\circ}8$ C. according to the formula of Chappuis. Arrangements have in the meantime been made for the re-determination of the absolute expansion of mercury at the Royal College of Science, and it is hoped that the results of this work, which will be applicable to the reduction of previous observations, such as those of Mr. Eumorfopoulos, will reduce materially the present uncertainty.

"The Spectrum of Scandium and its Relation to Solar Spectra." By Prof. A. **Fowler**. Communicated by Sir William Crookes, F.R.S.

The greater part of this investigation of the spectrum of scandium under different experimental conditions has been based on purified scandia, generously placed at the author's disposal by Sir William Crookes. The principal results are as follows:—

(1) The arc spectrum of scandium consists of two distinct sets of lines, which behave very differently in solar spectra. Each set includes both strong and faint lines.

(2) Lines belonging to one set correspond with the enhanced lines of other elements, notwithstanding that they appear strongly in the ordinary arc spectrum:—(a) these lines are very feeble or missing from the arc-flame spectrum, and are strengthened in passing to the arc, the arc in hydrogen, or the spark; (b) they occur as relatively strong lines in the Fraunhofer spectrum; (c) they are weakened in the sun-spot spectrum; (d) they occur as high-level lines in the chromosphere.

(3) The remaining lines show a great contrast when compared with the first group:—(a) they are relatively strong lines in the arc flame; (b) they are very feebly represented in the Fraunhofer spectrum; (c) the stronger lines are prominent in the sun-spot spectrum; (d) they have not been recorded in the spectrum of the chromosphere.

(4) The special development of the enhanced lines in the Fraunhofer spectrum, together with their presence in the upper chromosphere, indicates that the greater part of the scandium absorption in the solar spectrum originates at a higher level than that at which the greater part of the iron absorption is produced.

(5) The discussion of scandium lines indicates that while in the case of some elements solar identifications are to be based chiefly on arc lines, in others it is the enhanced lines which may be expected to show the most important coincidences.

(6) The flutings which occur in the arc and arc flame do not appear when the arc is passed in an atmosphere of hydrogen. As suggested by Thalén, they are probably due to oxide of scandium.

Tables are given which show the lines of the arc spectrum from 3030 to 6580, the positions of the oxide flutings, and comparisons of the principal lines of the two classes with the sun, sun-spots, and chromosphere.

EDINBURGH.

Royal Society, November 2.—Prof. A. Gray, vice-president, in the chair.—Temperature observations on Loch Garry: E. M. **Wedderburn**. The observations were made during the first seven months of 1908 by means of reversing mercury thermometers, and led to the following general results:—(1) the observations give a complete series for the time of year during which the lake is gaining heat, so that comparisons may be made between Loch Garry, of comparatively small size, and Loch Ness, of much larger size; (2) they show the apparently fortuitous manner in which freezing may take place in the larger temperate lakes; (3) they show how strong winds have the effect of producing currents at considerable depths; (4) they prove that the formation of the discontinuity temperature layer in a lake occurs whenever the surface layer begins to cool; (5) they establish the existence of a temperature seiche in small temperate lakes like Loch Garry, and show that

this temperature oscillation may exist even when the discontinuity is not pronounced. The attempts to measure the ordinary seiche in Loch Garry were not very successful, the seiches being irregular and difficult to measure. The periods indicated were 10.5–11.1 minutes for the uninode and about 5.5 minutes for the binodal.—The discharge of water from circular weirs and orifices: G. H. **Gulliver**. The elliptic integral which gives the discharge was computed graphically, and the results compared with experiment. Curves were drawn showing the relation between the discharge and the head. The observational and theoretical curves were of the same form, and were practically straight for heads between the centre and top of the circular aperture. This suggests that a circular weir, if kept more than half full yet not completely drowned, might be usefully employed in gauging streams. With the orifice of $2\frac{1}{2}$ inches diameter used in the experiments, the discharge in gallons per minute was given by the formula $11H-0.8$, where H is the head in inches above the lowest point of the orifice.—Dissymmetrical separations in the Zeeman effect in tungsten and molybdenum: Dr. Robert **Jack**. The relative intensities of the components of a Zeeman triplet depend upon polarisation effects of the grating in relation to the polarised state of the light. The experiments showed that concurrently with the change in the intensities of triplets for different parts of the spectrum there is a change in the type of dissymmetry. As the middle component passes through its minimum value there is a change from the normal dissymmetry (middle component nearer the red side component) to the abnormal dissymmetry (middle component nearer the violet side component). The dissymmetry could not be entirely accounted for by the angular position between the lines of the grating and the planes of vibration of the components. Voigt's theory based on the presence of couplings between electrons of different vibration period seemed to explain the phenomena sufficiently.—A question in absorption spectroscopy: Dr. R. A. **Houstoun** and A. S. **Russell**. The question is as to the effect of mixing two coloured solutions upon the absorption spectrum of each. Observations by Melde, Bostwick, Krüss, and Formánek seemed to indicate a shift of the absorption bands; but Schuster pointed out that a shift of this nature would be observed if, instead of mixing, the one solution was placed behind the other. Any other change indicated by theory would be too small to be appreciable. The experiments described in this paper were made by a differential method, so that the effect with the solutions in line, but not mixed, could be immediately compared with the effect when they were mixed. The conclusion came to was that there is no evidence for the existence of an effect of the kind described by the experimenters named above.

PARIS.

Academy of Sciences, November 2.—M. Emile Picard in the chair.—Spectroscopic researches on the Morehouse comet, 1908c: H. **Deslandres** and A. **Bernard**. The observations were commenced on October 14, ten days after those of La Baume-Pluvinel. Owing to the abnormal proportion of the blue to the ultra-violet rays, this comet, which was by eye observations of the sixth magnitude, appeared photographically of a higher magnitude. No trace of the hydrocarbon bands usual with comets could be detected; a continuous spectrum appeared on all the plates from October 14 onwards, but its intensity is relatively less than in the Daniel comet of last year. A table is given showing the wave-lengths and intensities of the principal condensations of the nucleus. Two ultra-violet bands of the cyanogen group are present, together with some lines of unknown origin, previously observed in Daniel's comet.—The pumice of the volcanic massif of Mont-Dore: A. **Lacroix**.—The value of the invariant p for a class of algebraic surfaces: L. **Remy**.—The influence of pressure on the ionisation produced in gases by the X-rays. The saturation current: E. **Rothé**. A study of the influence of pressure on ionisation phenomena in general. From pressures of 0.1 to 0.5 atmosphere the intensity of the saturation current is proportional to the pressure. The precautions found necessary for the regular working of the Crookes's tube are detailed.—Com-

pensation electrometers and electroscopes: M. **Hurmuzescu**. The apparatus described, and of which a diagram is given, is capable of measuring potentials down to 0.01 volt.—An apparatus for receiving radio-telegraphic time signals on board ship: C. **Tiesot** and Félix **Pellin**. A thermoelectric detector is employed, capable of responding to waves of one determined wave-length only.—A new determination of the mechanical equivalent of heat: V. **Crémieu** and L. **Rispail**. The heat produced was measured at constant temperature in a Bunsen ice calorimeter, the recent determinations of M. Leduc on the densities of the ice and water being used. The mean value obtained for J was 4.1851×10^7 ergs, with an experimental error of less than $1/1500$.—The separation of tungstic acid and silica: Paul **Nicolardot**. The method is based on the volatilisation of the tungsten by heating the mixture of tungstic acid and silica to 440° C. in a current of partially dried air and chloroform vapour.—The determination of the atomic weight of the simple ponderable substance, pantogen: G. D. **Hinrichs**. A fundamental material, pantogen, of atomic weight $1/128$, or 0.007813 , is assumed, and a theory developed of the weight and geometrical form of the atoms of hydrogen, helium, nitrogen, oxygen, and fluorine.—The phosphides of zinc: Pierre **Jolibois**. Zinc and red phosphorus were heated to a red heat in a crucible until phosphorus vapours ceased to be evolved. The resulting phosphide was separated from the excess of zinc by three methods:—the volatilisation of the zinc in a vacuum at 600° C., the solution of the zinc in mercury, and the action of fuming nitric acid. The same phosphide is left by all three methods of separation, and its composition corresponds to the formula Zn_3P_2 . This phosphide with dilute hydrochloric acid gives a very pure phosphoretted hydrogen. The preparation and properties of ZnP_2 are also described.—The hydrolysis of perchloride of iron; the influence of neutral salts: G. **Maifitano** and L. **Michel**. Solutions of ferric chloride to which potassium chloride has been added present the phenomena of the colloidal state more rapidly and to a greater degree than solutions of pure ferric chloride. Other chlorides (sodium, barium, ammonium, magnesium) behave in a similar manner.—Aloesol, a complex phenol prepared with the aid of certain aloes: E. **Léger**. The tetrachloro-derivative of a new phenol is obtained by the action of hydrochloric acid and potassium chlorate on Cape aloes.—The fixation of different derivatives of the same colouring matter, and an explanation of dyeing: L. **Pelet-Jolivet** and N. **Andersen**. The experiments cited confirm the theory of dyeing of Freundlich and Loser.—Glycocholic acid: Maurice **Piettre**. The method described is capable of giving a yield of 60 per cent. to 75 per cent. of the bile as glycocholic acid, and the product is not contaminated with taurocholic acid, an advantage over the usual methods of separation. The chemical and physical properties of the purified acid are given, together with the results of some experiments on the toxic power of sodium glycocholate.—The colloidal properties of starch and the unity of its constitution: Eugène **Fouard**.—The oidium of the oak: Paul **Harriot**. This disease of the oak has become widely distributed in France during the last year, and the dry north-east winds appear to have contributed to the spreading. All the native trees may be attacked, but the American oak appears to be immune.—The discovery of coal in Madagascar by Captain Colcanap: Marcellin **Boule**. Layers of coal, of a thickness of 0.3 to 0.5 metre, have been discovered in the neighbourhood of Bénénitra.—Report of the wireless telegraphy committee of the Academy of Sciences: Bouquet de la Grye.

DIARY OF SOCIETIES.

THURSDAY, NOVEMBER 12.

ROYAL SOCIETY, at 4.30.—The Charges on Ions in Gases, and the Effect of Water Vapour on the Motion of Negative Ions: Prof. J. S. Townsend, F.R.S.—The Charges on Ions produced by Radium: C. E. Haselfoot.—The Occlusion of the Residual Gas and the Fluorescence of the Glass Walls of Crookes's Tubes: A. A. Campbell Swinton.—An Investigation on the Anatomical Structure and Relationships of the Labyrinth in the Reptile, the Bird and the Mammal: Dr. A. A. Gray.—The Natural Mechanism for Evoking the Chemical Secretion of the Stomach (Preliminary Communication): Dr. J. S. Edkins and Miss M. Tweedy.—Further